

## REMARKS/ARGUMENTS

After entry of this amendment, claims 1-3 and 5-53 will be pending in this application. Claims 1, 5-10, 12-15, 42-44, and 46 have been amended herein. Claim 4 has been canceled herein. Claims 54-222 have been withdrawn as a result of an earlier restriction requirement. No new claims have been added.

### **1. § 102 Rejections based upon U.S. Patent No. 4,235,616 (Siegfried)**

The Examiner has rejected claims 1-3, 17, 24-27, and 33 under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 4,235,616 (Siegfried).

The Examiner asserts that Siegfried '616 discloses a method for making an optical fiber preform (Col. 1, lines 31ff). As for claims 2-3, the glass precursors comprise germanium tetrachloride and SiCl<sub>4</sub> (col. 6, line 38). As for claims 24 and 33, the substrate tube where the soot is deposited is rotated (col. 6, line 51), and as for claims 25-27, the continuously deposited soot containing silica and/or germania would form the claimed first through fourth segments.

Respectfully, as now amended, the rejection of claim 1 is traversed. In particular, Siegfried '616 teaches a method of producing an optical fiber perform wherein silica soot is deposited on the inside of a tube 58, i.e., an Inside Vapor Deposition (IVD) method. Such IVD methods have significant disadvantages in that large diameter preforms are not easily achievable, and that a large centerline hole will need to be closed in order to draw an optical fiber therefrom. Accordingly, such methods suffer from low production efficiency and possible centerline defects due to having to close the large centerline hole.

The present invention overcomes these disadvantages by depositing the soot on the outside surface of a rotating substrate, thereby allowing deposition to large diameters while providing much smaller centerline holes (because a burner does not need to fit within the hole). Additionally, claim 1 now includes the further limitation of flowing a substantially water-free atmosphere over the soot perform during the step of depositing thereby minimizing the possibility of exposing the already formed dry soot to additional

moisture. Accordingly, the present invention provides a method of forming substantially dry soot performs by an OVD method.

Examiner should note that, contrary to his assertion, nowhere in the Siegfried '616 reference does it fairly teach or suggest that the atmosphere provided should be substantially water-free. In particular, Col. 6, lines 63-68 teaches that a fuel gas such as CO, CS<sub>2</sub>, C<sub>2</sub>N<sub>2</sub> or the like may be used to avoid incorporation of hydrogen, hydrogen ions, water, or the like into the into the glass being formed. In Col. 6, lines 61-62 the Siegfried specification says that such fuel gas and oxygen (emphasis added) are introduced to the burner. Thus, although Siegfried recognizes that substantially H-free fuels should be employed in an IVD context; there is no statement whatsoever about the condition of the oxygen gas being provided in Siegfried '616. Examiner is simply assuming one point of novelty of the present invention exists in Siegfried '616, i.e., that the environment is substantially water-free, when there is no requisite teaching of such in Siegfried '616.

In short, there is no clear and particular teaching in Siegfried '616 that the atmosphere flowing over the soot perform should be substantially water-free. In accordance with the present invention, dry soot performs are best achieved when the fuel, glass precursors and other gases provided to the preform are all substantially water-free. Accordingly, the novelty rejection of claim 1 is flawed and should be withdrawn. The rejection of claims 2-3, 17, 24-27 and 33 should be withdrawn for at least these reasons.

## 2. Rejections of claims 4-11 under 35 U.S.C. §103(a)

The Examiner has rejected claims 4-11 under 35 U.S.C. §103(a) as being unpatentable for obviousness over U.S. Patent No. 4,235,616 (Siegfried).

The Examiner asserts that because in Siegfried '616 the gases supplied only include hydrogen-free fuels and glass forming materials, it would be obvious to a person of ordinary skill in the art that the deposition of the soot would occur in a water-free atmosphere.

Again, Examiner is assuming obviousness at the point of novelty. Oxygen is a gas that must also be present for combustion, and Siegfried makes no statement whatsoever

about the absence of humidity in the oxygen. This is important, because even a very small amount of water vapor present in the atmosphere may introduce unwanted hydrogen, OH or water into the formed soot perform which may adversely affect the absorption of the fiber produced therefrom at and near the fiber's water peak (at or near 1383 nm). Moreover, as now claimed, in addition to the lack of any suggestion in Siegfried '616 that the atmosphere flowing over the soot perform should be substantially water-free, the Siegfried '616 reference does not teach or suggest depositing the silica-containing soot onto an outside surface of a rotating substrate. Accordingly, the present invention outside vapor deposition method produces substantially-dry soot performs and is substantially more productive and less prone to centerline defects than the Siegfried '616 method. Accordingly, for these reasons, the rejection of claims 5-11 should be withdrawn. Claim 4 is now canceled with the subject matter thereof being introduced in claim 1.

### 3. Rejections of claims 12-16 and 42-46 under 35 U.S.C. §103(a)

The Examiner has rejected claims 12-16 and 42-46 as being unpatentable for obviousness under 35 U.S.C. §103(a) over U.S. Patent No. 4,235,616 (Siegfried) in light of U.S. Patent No. 6,266,980 (Lemon et al.) and Japanese Patent No. JP 09110454 (Daito). Respectfully, the rejection of claims 12-16 and 42-46 is also traversed. First, as amended, the invention of claim 1, upon which claims 12-16 and 42-46 depend, is not taught or suggested by Siegfried '616 (see claim 1 discussion above). Furthermore, neither Lemon nor Daito remedy the deficiencies in Siegfried '616. In particular, neither Lemon nor Daito teach including a soot perform (*emphasis added*) within a substantially water-free environment during transfer.

Specifically, Lemon teaches that the centerline of a *consolidated preform* (as opposed to a soot preform) may be protected from rewetting by exposing or purging the preform's centerline aperture to a heavy inert gas during transfer. In Col. 2, lines 8ff of Lemon et al. it is also the consolidated (transparent glass) preform that is placed in the argon-filled holding vessel. It should be recognized that the preform referred to in the present claims 1, 12-16 and 42-46 is a soot perform. Lemon simply does not teach or

suggest anything about the water-free processing of the soot preform, but deals only with processing of, and preventing rewetting of the centerline of a consolidated (vitrified glass) perform which is produced later in the perform fabrication process.

Daito teaches a method of transporting a preform between various clean portions of a factory wherein the perform is housed in a stowage container 16 which is supplied with clean filtered air from a compressed air tank 30. Daito teaches that the air is supplied such that a positive pressure is provided in the container 16 thereby preventing open air from entering the container (see mechanical translation from the JAPIO site attached). It should be recognized that Daito only teaches clean air and does not, however, in any way, teach or suggest that the compressed air should also be substantially water-free. Quite simply, Daito never mentions any desirable humidity condition of the clean filtered air; it only says the air is compressed and filtered. Notably, compressed air would include substantially the same humidity as the air that was compressed and supplied to the compressed air tank. Again, it is asserted that Examiner is assuming obviousness at the point of novelty. Simply, Daito does not teach that the air should be substantially water-free. Accordingly, because there is no requisite clear teaching or suggestion in either Lemon or Daito to include the soot perform within a substantially water-free environment during transfer, the rejection of claims 12-16 and 42-46 under 35 U.S.C. §103(a) should be withdrawn.

#### **4. Rejections of claims 1-31, 46 and 49-53 under 35 U.S.C. §103(a)**

The Examiner has rejected claims 1-31, 46, and 49-53 under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,627,866 (Kanamori).

The Examiner asserts that Kanamori et al. discloses a VAD method for producing an optical fiber perform, but admits that Kanamori et al. does not disclose using an H-free fuel. Examiner then goes on to indicate that it would be obvious to substitute an H-free fuel for the H-containing fuel used is well known in the art (citing Siegfried and Winterburn) in order to avoid the deleterious effects of hydrogen contamination. First, Kanamori is an Vapor Axial Deposition (VAD) method and is not applicable to the

problem of producing dry soot performs by an outside vapor deposition. Likewise, Winterburn is not applicable to producing optical fiber soot performs.

In particular, a person of ordinary skill in the art would not be motivated to combine Kanamori with Winterburn because they are directed toward entirely different problems and, thus, are non-analogous. Kanamori is posed with producing a perform by VAD, while Winterburn is directed to making one vitreous glass boules. In re Deminski teaches us that to determine whether a reference is analogous is determined by a two part test: 1) whether the art is from the same field of endeavor, regardless of the problem addressed, and 2) if the reference is not within the field of endeavor, whether the reference is still reasonably pertinent to the particular problem with which the inventor is involved. In re Deminski, 796 F.2d 436, 442, 230 USPQ 313, 315 (Fed. Cir. 1986). Under prong 1), the art are not directed to the same field of endeavor. Kanamori is directed to VAD optical fiber soot perform production, while Winterburn is directed to production of vitreous glass boules. As to the second prong, Kanamori is reasonably directed to producing optical fiber soot performs by VAD. Winterburn is reasonably directed to producing glass boules with low water content. However, Winterburn does not teach any dual refractive index structure that could be used for a waveguide or otherwise any way of utilizing the boule for an optical waveguide. Therefore, the second prong is not met because they are directed to different problems. Accordingly, since neither prong is met, the art is deemed non-analogous and the §103 rejection based upon the combination of Kanamori and Winterburn should be withdrawn.

Similarly, the combination of Kanamori with Siegfried does not arrive at the claimed invention. Neither reference teaches or suggests that the atmosphere flowing over the soot preform should be substantially water-free. Certainly, having a low water atmosphere is of no importance in Kanamori as it teaches the use of a H-containing fuel ( $H_2$ ) and the use of such H-containing fuels will form water in the deposition process. Moreover, as discussed with reference to claim 1, there is no requisite teaching or suggestion in Siegfried that the oxygen provided to the burner should be substantially water-free. Accordingly, the combination of Kanamori with Siegfried does fairly teach

or suggest the claimed invention. As such, the 103 rejection of claims 1-31, 46, and 49-53 should be withdrawn.

#### **5. Rejections of claims 31-41 under 35 U.S.C. §103(a)**

Claims 34-41 are rejected under 35 U.S.C. §103(a) as being unpatentable over Kanamori et al in view of Japanese Patent No. JP 57-183331 (Senda).

Respectfully, the rejection is traversed. In particular, the combination of Kanamouri and Senda does not arrive at the invention claimed. Claims 34-41 depend upon claim 1 and neither reference teaches flowing a glass precursor into the flame produced by igniting a *substantially hydrogen-free fuel* (emphasis added) to produce silica-containing soot. In particular, both references teach utilizing H-containing fuels in the burner. Accordingly, the combination of Kanamouri and Senda does not fairly teach or suggest the claimed invention of claim 1 wherein the flame is produced by igniting a *substantially hydrogen-free fuel*. Claims 34-41 are allowable for at least those reasons.

#### **6. Rejections of claim 32 under 35 U.S.C. §103(a)**

Claim 32 is rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,627,866 (Kanamori et al) in view of Japanese Patent No. JP 63-123829 (Seto et al).

Respectfully, the rejection is traversed. The combination of Kanamori with Seto does not arrive at the claimed invention. Neither reference teaches or suggests that the atmosphere flowing over the soot preform should be substantially water-free, as now described in claim 1 (from which claim 32 depends). Certainly, having a low water atmosphere is of no importance in Kanamori as it teaches the use of an H-containing fuel ( $H_2$ ) and, thus, water will be produced in the deposition reaction. Moreover, there is also no requisite teaching or suggestion in Seto that the atmosphere flowing over the soot preform should be substantially water-free. Accordingly, the combination of Kanamori with Seto also does not fairly teach or suggest the claimed invention. Therefore, the 103 rejection of claims 32 should be withdrawn.

Appl. No.: 09/833,540  
Amdt. Dated: 4/6/2004  
Reply to Office Action of: 01/15/2004

Based upon the above amendments, remarks, and papers of records, applicant believes the pending claims of the above-captioned application are in allowable form and patentable over the prior art of record. Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Applicant believes that no extension of time is necessary to make this Reply timely. Should applicant be in error, applicant respectfully requests that the Office grant such time extension pursuant to 37 C.F.R. § 1.136(a) as necessary to make this Reply timely, and hereby authorizes the Office to charge any necessary fee or surcharge with respect to said time extension to the deposit account of the undersigned firm of attorneys, Deposit Account 03-3325.

Please direct any questions or comments to Randall S. Wayland at 607-974-0463.

Respectfully submitted,

Date: 4-8-04

  
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